State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawaii 96813

August 12, 2011

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. Robert Toonen, University of Hawaii, Hawaii Institute of Marine Biology, for Access to State Waters to Conduct Intertidal Biodiversity Survey Activities

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument research permit to Dr. Robert Toonen, , Hawaii Institute of Marine Biology, pursuant to § 187A-6, Hawaii Revised Statutes (HRS), chapter13-60.5, Hawaii Administrative Rules (HAR), and all other applicable laws and regulations.

The research permit, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument (Monument), including the NWHI State Marine Refuge and the waters (0-3 nautical miles) surrounding the following sites:

- Nihoa Island
- Necker Island (Mokumanamana)
- French Frigate Shoals
- Gardner Pinnacles

The activities covered under this permit would occur between September 1, 2011 and November 30, 2011.

The proposed activities are largely a renewal of work previously permitted and conducted in the Monument. New activities in this application include the examination of fertilization success of opihi within the Monument.

INTENDED ACTIVITIES

The Applicant proposes to examine the biodiversity of the Hawaiian intertidal ecosystem, and study the basic ecology of 'opihi populations within the NWHI.

There are several objectives of this proposed research. The Applicant would integrate traditional and western ecological survey techniques, would continue to collect biodiversity and genetic connectivity data within the nearshore, and would utilize opihi genetic information to understand evolutionary processes.

To carry out this project, the Applicant proposes to conduct standardized surveys developed collaboratively among various partners (including Na Mamo o Muole'a, the Nature Conservancy, HIMB, Friends of Papahānaumokuākea, and NOAA) to intergrate quantitative scientific data collection with Native Hawaiian observational data. The project would also involve collection of nearshore invertebrates, fish, and algae by hand. Non lethal tissue biopsies would taken whenever possible. Certain species would be shared with Ms. Shauna Kehaunani Tom, the Applicant requesting a Native Hawaiian Practice permit which would coincide and integrate with this research proposal. Ms. Tom would examine the gonad proportional weight for these opihi and urchin specimens. Sperm samples from opihi would be cryo frozen and stored at HIMB upon return. These samples would be kept frozen until the natural spawning season then used in laboratory experiments to determine the fertilization success of animals in the Northwestern Hawaiian Islands as compared to animals within the main Hawaiian Islands. This would indicate to researchers and managers the mechanisms and strength of reproductive isolation in these animals. For more details on the collections, see below or refer to the Applicant's own collection table found at the end of his permit application (F-5a).

The research project would involve the following collections:

1. Up to 50 lethal specimen collections per island visited (4) of nine (9) invertebrates: opihi (2 species), barnacle, bivalve, periwinkles, drupe snail, bubble shell, nerites, and the shingle urchin.

2. Up to 100 lethal specimen collections per island visited (4) of the invertebrate: False opihi.

3. Up to 50 non lethal tissue sample collections per island visited (4) of the following six (6) species: zebra blenny, marbled blenny, oblong urchin, thin shelled rock crab, mulberry drupe, rock boring urchin.

4. Up to twenty (20) non lethal pinches of turf algae along each of the transects surveyed. There are a proposed minimum of 20 transects per island, so a minimum of 400 non lethal pinches of algae are proposed per island visited (4).

5. Up to three (3) voucher specimens of an individual organism that cannot be identified as a known species and/or may represent a new geographic record from the taxonomic groups under study.

The activities proposed by the Applicant directly support the Monument Management Plan's priority management needs 3.1 – Understanding and Interpreting the NWHI (through action plan 3.1.1 – Marine Conservation Science).

The activities described above may require the following regulated activities to occur in State waters:

☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource

☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

REVIEW PROCESS

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since June 10th, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Comments received from the scientific community are summarized as follows:

Scientific reviews support the acceptance of this application. The following questions were raised:

1. *What ship will be used for this activity? The application indicates no specific ship had yet been procured. The applicant needs to secure a ship and demonstrate that it is in full compliance with all Monument regulations, including hull inspection.*

The applicant states that the actual vessel is still undetermined. The M/V SEARCHER is being considered due to its extensive experience supporting Monument conservation and management activities. The vessel selected for this cruise would be in full compliance with all Monument regulations, including hull inspection, installation of a working type-approved vessel monitoring system, and rat-free certification.

2. *What museums are the samples going to be sent to?*

The Applicant's first choice would naturally be the Bishop Museum, but if they were unwilling or unable to accept the samples, he would request that voucher specimens be housed in the collection of the Smithsonian National Museum of Natural History.

3. *The application lists that a "minimum of 20 transects will be surveyed". What is the proposed upper range # of transects that would be surveyed.*

The Applicant explains that he tries to do as many transects as safely possible within the timeframe allowed at each location. His research requires a minimum of about 20 transects in order to give statistical rigor to the data collected, but the more transects completed, the more accurate the estimate of population density at each location, so he would attempt as many as possible. To date, the maximum number of transects run at any location is 120.

Comments received from the Native Hawaiian community are summarized as follows:

Cultural reviews support the acceptance of this application.

Comments received from the public are summarized as follows:

No comments were received from the public on this application.

Additional reviews and permit history:

Are there other relevant/necessary permits or environmental reviews that have or will be issued with regard to this project? (e.g. MMPA, ESA, EA) Yes ☒ No ☐
If so, please list or explain:

- The proposed activities are in compliance with the National Environmental Policy Act.
- The proposed activities are in concurrence with ESA Section 7.
- The Department has made an exemption determination for this permit in accordance chapter 343, HRS, and Chapter 11-200, HAR. See Attachment ("DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. ROBERT TOONEN, HAWAII INSTITUTE OF MARINE BIOLOGY, FOR ACCESS TO STATE WATERS TO CONDUCT INTERTIDAL BIODIVERSITY SURVEY ACTIVITIES UNDER PERMIT PMNM-2011-041")

Has Applicant been granted a permit from the State in the past? Yes ☒ No ☐
If so, please summarize past permits:

The Applicant was granted permits DLNR/NWHI/06R005, PMNM-2007-033, PMNM-2008-047, and PMNM-2009-032, and PMNM-2010-037 to conduct invertebrate genetic connectivity work in 2006 through 2010. In addition, the current proposal is a continuation of worked carried under permits PMNM-2009-046 and PMNM-2010-040, issued to Mahina Duarte and Andy Collins respectively.

Have there been any a) violations: Yes ☐ No ☒
b) Late/incomplete post-activity reports: Yes ☐ No ☒

Are there any other relevant concerns from previous permits? Yes ☐ No ☒

STAFF OPINION

DAR staff is of the opinion that Applicant has properly demonstrated valid justifications for his application and should be allowed to enter the NWHI State waters and to conduct the activities therein as specified in the application with certain special instructions and conditions, which are in addition to the Papahānaumokuākea Marine National Monument Research Permit General Conditions. All suggested special conditions have been vetted through the legal counsel of the Co-Trustee agencies (see Recommendation section).

MONUMENT MANAGEMENT BOARD OPINION

The MMB is of the opinion that the Applicant has met the findings of Presidential Proclamation 8031 and this activity may be conducted subject to completion of all compliance requirements. The MMB concurs with the special conditions recommended by DAR staff.

RECOMMENDATION

Based on the attached proposed declaration of exemption prepared by the department after consultation with and advice of those having jurisdiction and expertise for the proposed permit

actions:

1. That the Board declare that the actions which are anticipated to be undertaken under this permit will have little or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment.

2. Upon the finding and adoption of the department's analysis by the Board, that the Board delegate and authorize the Chairperson to sign the declaration of exemption for purposes of recordkeeping requirements of chapter 343, HRS, and chapter 11-200, HAR.

3. That the Board authorize and approve a Research Permit to Dr. Robert Toonen, Hawaii Institute of Marine Biology, with the following special conditions:

a. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.

b. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.

c. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.

d. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.

e. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge.

f. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional and customary practices by Native Hawaiians.

Respectfully submitted,

for Administrator

APPROVED FOR SUBMITTAL

FOR William J. Aila, Jr.
Chairperson

Papahānaumokuākea Marine National Monument

RESEARCH Permit Application

NOTE: ***This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument. The Co-Trustees are required to determine that issuing the requested permit is compatible with the findings of Presidential Proclamation 8031. Within this Application, provide all information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Papahānaumokuākea Marine National Monument (Monument).***

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.

- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.

- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:
Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
nwhipermit@noaa.gov
PHONE: (808) 397-2660 FAX: (808) 397-2662

SUBMITTAL VIA ELECTRONIC MAIL IS PREFERRED BUT NOT REQUIRED. FOR ADDITIONAL SUBMITTAL INSTRUCTIONS, SEE THE LAST PAGE.

Papahānaumokuākea Marine National Monument
Permit Application Cover Sheet

This Permit Application Cover Sheet is intended to provide summary information and status to the public on permit applications for activities proposed to be conducted in the Papahānaumokuākea Marine National Monument. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. The Monument permit process also ensures that all environmental reviews are conducted prior to the issuance of a Monument permit.

Summary Information

Applicant Name: Robert J. Toonen
Affiliation: Hawai'i Institute of Marine Biology, University of Hawai'i at Mānoa

Permit Category: Research
Proposed Activity Dates: September - November 2011
Proposed Method of Entry (Vessel/Plane): Vessel
Proposed Locations: Intertidal and shallow water habitats around basaltic islands on which 'opihi occur. Specifically, Nihoa Island, Mokumanamana (Necker) Island, Mokupapapa (La Perouse Pinnacle at French Frigate Shoals), and Puhahonu (Gardner Pinnacles).

Estimated number of individuals (including Applicant) to be covered under this permit: Twelve total people will be covered under this permit, co-listed under the Native Hawaiian Practices application submitted by Ms. Shauna Kehaunani Tom.

Estimated number of days in the Monument: approximately 12 days

Description of proposed activities: (complete these sentences):

a.) The proposed activity would…

aim to examine the biodiversity of the Hawaiian intertidal ecosystem, and study the basic ecology of 'opihi populations within the NWHI. Additionally, we propose to conduct the first comprehensive biodiversity survey of the intertidal zone in the NWHI and quantify species presence/absence and relative abundances within and among sites across the basaltic emergent islands. To this end we will sample species of uncertain taxonomy for combined morphological and DNA bar-coding analyses. We also seek to examine population connectivity of intertidal species in comparison to the broad survey of coral reef organisms sampled to date. We find different patterns of larval exchange among the 'opihi which suggests that intertidal species may differ from the average seen in subtidal taxa, and that has important management implications that need to be confirmed. Finally, we propose to examine the reproductive status and fertilization success of select 'opihi populations across the NWHI to better understand natural population dynamics and potential mechanisms of speciation in this economically, ecologically and culturally important limpet.

This research permit application is tightly linked with the Native Hawaiian cultural practice application of Ms. Tom and is a joint collaborative study among Na Mamo o Muole'a, the Nature Conservancy, the Hawai'i Institute of Marine Biology, Friends of Papahānaumokuākea, and the NOAA Papahānaumokuākea Marine National Monument. We will perform the standardized 'opihi monitoring protocol developed through this collaboration, which is inclusive of Hawaiian methods of monitoring, has was specifically developed (and is continuously being refined) to monitor intertidal populations associated with 'opihi across the Main and Northwestern Hawaiian Islands. To date, communities on Hawai'i Island, Maui, Kaho'olawe, Lana'i have participated in community-led 'opihi surveys and through these collaborative efforts the NWHI has also been surveyed for intertidal species composition, population size and age structure of organisms associated with 'opihi. Here we request a permit to conduct the third year of surveys and monitoring within the NWHI.

b.) To accomplish this activity we would ....
conduct standardized surveys developed collaboratively among the partners listed above to integrate quantitative scientific data collection with Native Hawaiian observational data. In addition, we will collect some target invertebrates by hand for taxonomic study (combined morphological and DNA-sequence based "bar-coding") where species identity is in question. We will collect small tissue samples from a handful of very common intertidal species to examine patterns of population connectivity in the intertidal zone and compare that directly to the patterns found in subtidal species, and some 'opihi will be collected for gonad index and fertilization experiments as outlined below and in the accompanying Native Hawaiian Practices Permit Application filed by Ms. Tom. Specifically, we will lay a minimum of 20 belt transects per island or atoll to assess class size, population density, community structure, species range, distribution, and rugosity for all identifiable organisms within the intertidal zone. Samples we request to be collected for this work are summarized in Appendix 1. All data will be stored and analyzed at the Hawai'i Institute of Marine Biology by co-PIs Toonen & Bird. These data will be useful to both the Monument, as well as to local and governmental resource managers in the Main Hawaiian Islands to make effective decisions on managing the resources.

c.) This activity would help the Monument by ...
providing baseline knowledge of one of the least studied and potentially most threatened by climate change of all ecosystems in the Hawaiian archipelago. Sea level rise is inevitable at this point, and the first community to feel the effects of climate change will be the one that lives at the interface of land and sea and experiences the greatest extremes of both environments: the intertidal. Limited knowledge of this ecosystem restricts our understanding of climate change impacts and suitable responses. Further, knowing which species occur and where they live is fundamental to the management of natural resources in any ecosystem, and the Hawaiian intertidal zone is poorly characterized in general. We will also confirm whether or not the intertidal species show a different pattern of population connectivity across the archipelago than do the subtidal ones surveyed to date. These data will provide the first quantitative data on the species present in these ecosystems, their biodiversity, population dynamics and connectivity and also contribute to the ongoing debate about how new species arise in the sea. The tight

collaboration of the team comprised of cultural practitioners, research scientists, and resource managers will ensure that the findings are of relevance to a broad group of stakeholders and of direct relevance to the people of Hawai'i.

Other information or background: Littoral habitats, those lying between the low-tide line and the upper limit of aquatic species on the shore, are among the most studied and well-known aquatic habitats on the planet. A primary exception to that generalization is that this zone is one of the least studied in Hawai'i. The effects of tides on littoral marine habitats are so ubiquitous that shorelines are commonly described as 'intertidal', whereas waves are considered a secondary factor that simply modifies the intertidal habitat. However in Hawai'i, mean significant wave height exceeds tidal range most of the time, and may be a primary structuring force for littoral communities as outlined in Bird (2006). The patterns of distribution and abundance of organisms on rocky shores, in particular the upper and lower limits of species, along vertical gradients of exposure have been studied extensively in other regions of the globe. Hypotheses addressing the causes of biotic zonation and community structure have evolved from strictly physical to an inseparable combination of physical and biological factors, including physiological tolerance (Connell 1961a b), species interactions (Bruno & Bertness 2001, Menge & Branch 2001), and all other forms of biotic factors.

A fundamental advance in the understanding of biotic zonation on rocky shores was the demonstration that species interactions also affected zonation patterns, where biotic factors generally affect the lower limit of distribution and physical factors affect the upper limit of distribution (Connell 1961a b, Paine 1967). A number of exceptions to this generalization have been demonstrated, many of which highlight the more general effect of biological interactions on the realized distribution of a species. Ultimately, the inseparable interaction between physical and biological factors define the realized limits of species (Denny & Wethey 2001), and intertidal communities are unique in that organisms must cope with some of the most severe extremes of both marine and terrestrial environments. This has led to debate about whether these species are so hardy that they are resistant to change, or whether they live in such extreme environments that climate change will impact them more (e.g., Stillman 2003). Available data from long-term surveys of the intertidal community in California suggest the latter: intertidal communities are one of the first to show ecosystem impacts of climate change that can already be documented and are expected to accelerate given future climate change scenarios (e.g., Barry et al 1995; Sagarin et al. 1999).

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Robert J. Toonen

Title: Associate Researcher, Hawai'i Institute of Marine Biology

1a. Intended field Principal Investigator (See instructions for more information):
Rob Toonen or Chris Bird

2. Mailing address (street/P.O. box, city, state, country, zip):
Hawai'i Institute of Marine Biology, University of Hawai'i at Mānoa
[redacted]

Phone: [redacted]

Fax: [redacted]

Email: [redacted]

For students, major professor's name, telephone and email address:
Rob Toonen, HIMB
[redacted]

3. Affiliation (institution/agency/organization directly related to the proposed project):
Hawai'i Institute of Marine Biology,
School of Ocean & Earth Science & Technology,
University of Hawai'i at Mānoa.

4. Additional persons to be covered by permit. List all personnel roles and names (if known at time of application) here (e.g. John Doe, Research Diver; Jane Doe, Field Technician):

We expect that the final list of cruise personnel will be available soon, but has not yet been finalized. We seek a crew of 12 people drawn from across the partners listed above and these are the same participants as those on the Native Hawaiian Practices Permit Application filed by Ms. Tom.

We expect that the scientific crew will likely consist of 3 to 4 members, likely drawn from the following list or their equivalent expertise:
Chris Bird (Ph.D., Researcher, HIMB),
Rob Toonen (Ph.D., Researcher, HIMB),
Jennifer Smith (Ph.D., Researcher, Scripps Institution of Oceanography)
Emily Fielding (Nature Conservancy)
Hoku Johnson (PMNM, Resource manager)
Matt Ramsey (former DAR, Resource manager)
Shauna Kehaunani Tom (MS, ʻopihi researcher & cultural practitioner)

Additional crew members will be selected from Native Hawaiian communities as outlined in the Tom permit application and be included here as co-listed permittees for a maximum of 12 people in total.

Section B: Project Information

5a. Project location(s):

		Ocean Based	
☒ Nihoa Island	☒ Land-based	☒ Shallow water	☐ Deep water
☒ Necker Island (Mokumanamana)	☒ Land-based	☒ Shallow water	☐ Deep water
☒ French Frigate Shoals	☒ Land-based	☒ Shallow water	☐ Deep water
☒ Gardner Pinnacles	☒ Land-based	☒ Shallow water	☐ Deep water
☐ Maro Reef			
☐ Laysan Island	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Lisianski Island, Neva Shoal	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Pearl and Hermes Atoll	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Midway Atoll	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Kure Atoll	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Other			

NOTE: There is a fee schedule for people visiting Midway Atoll National Wildlife Refuge via vessel and aircraft.

Location Description:
As outlined above, our survey and collection efforts will be concentrated in the intertdial zone, surrounding each emergent basaltic land mass on which 'opihi occur. Although we include this within the land-based category above, the monitoring team would not access any sites beyond the splash zone on any island.

5b. Check all applicable regulated activities proposed to be conducted in the Monument:
☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
☐ Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
☐ Anchoring a vessel
☐ Deserting a vessel aground, at anchor, or adrift
☐ Discharging or depositing any material or matter into the Monument
☐ Touching coral, living or dead
☐ Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
☐ Attracting any living Monument resource
☐ Sustenance fishing (Federal waters only, outside of Special Preservation Areas, Ecological Reserves and Special Management Areas)
☐ Subsistence fishing (State waters only)
☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

6 Purpose/Need/Scope ***State purpose of proposed activities:***
The primary objectives of this research expedition are to: (1) collect complementary data on the intertidal ecosystem with a suite of research scientists, cultural practitioners, and resource managers; (2) establish a baseline survey of intertidal ecosystems, specifically focused on 'opihi species associations, relative abundance, and reproductive cycles to better understand the implications and consequences of climate change on these communities; (3) determine the species present using joint morphological and molecular DNA analyses to characterize the biodiversity of the Hawaiian intertidal zone and their connectivity to one another across the archipelago; and (4) begin to explore the mechanisms of speciation in the sea using 'opihi as a model system to elucidate the mechanisms by which divergent selection can lead to adaptive radiation of marine species.

Along these same lines we request permission to collect up to 3 voucher specimens of an individual organism that cannot be identified as a known species and/or may represent new geographic records or new species from the taxonomic groups under study as laid forth in the voucher specimen guidelines of the Monument. Voucher specimen(s) would be used for taxonomic study to determine the species identity and would be accessioned in an approved repository such as the Bishop and/or Smithsonian museum permanent collections as recommended.

7. Answer the Findings below by providing information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Monument:

The Findings are as follows:

a. How can the activity be conducted with adequate safeguards for the cultural, natural and historic resources and ecological integrity of the Monument?

Most activities in this permit application were previously permitted and have demonstrated no impact on Monument cultural, natural and historic resources. Even the activities that have not previously been permitted within the scope of this work have been conducted safely within the scope of previously permitted research. Our research team consists of conservation biologists who are both teaching and studying the science of how best to manage and conserve biological diversity in the sea. As such, minimizing our impact to the ecosystem we are trying to conserve is naturally and inherently a top priority for any research we conduct, especially within the boundaries of the Monument. We believe that we have implemented every reasonable safeguard for the natural resources and ecological integrity of the Monument in our research, and we do not conduct research that could have a detectable impact to the ecosystem. We have an established track record of management-relevant research in this area and have not been able to detect any cumulative impacts of scientific collections to date (Selkoe et al. 2009). As outlined in greater detail below, our sample size, choice of species, and methodologies have all been selected to provide robust and scientifically rigorous information to managers with the least possible impact to the natural resources of the Monument. We will adhere to all rules, regulations and best

practices established by the co-trustees for the Monument, including all quarantine requirements, wildlife viewing guidelines, and entry/exit notification procedures where applicable.

Additionally, our team has always tried and will continue to ensure that we have minimal impact on the cultural resources of Papahānaumokuākea. We rely on our colleagues who are cultural practitioners to take the lead on proper protocols for our voyage, and these are outlined in detail in the accompanying permit application by Tom. Regardless, each member of our team is already aware of the unique ecological and cultural status of the Monument, and our on-going collaboration with the cultural practitioners continues to expand our understanding of Hawaiian protocol in conducting research within Papahānaumokuākea Marine National Monument.

In addition to following the lead of our cultural practitioner team-mates, we ask that each researcher take responsibility to prepare an appropriate offering in advance to ensure that they reflect on why they are on this trip, what is the purpose of the trip, and enter the Monument with the proper intent. It is respectful to provide an offering and to not go forth to take from the place with empty hands. However, given concerns regarding transport of materials into the Monument, it is also difficult to present a proper offering in the form of a gift. In previous years, we have used pure rainwater collected by hand to ensure a personal connection with the offering, and we believe that this is the best option for research scientists unfamiliar with the proper cultural protocols. This fresh-caught rainwater can be autoclave sterilized (to ensure no biological transport) and poured out as a personal offering in return for the privilege of collecting samples in the Monument by each member of our team. In addition we will follow the lead and participate to the best of our ability in protocols undertaken by our cultural colleagues in whatever preparation is appropriate for the voyage.

b. How will the activity be conducted in a manner compatible with the management direction of this proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects?

With the exception of the fertilization success of ‘opihi within the Monument, all research proposed herein has been permitted previously and conducted without detectable impact in the past. Our expansion of the scope of the initial surveys to include biodiversity surveys and connectivity work in the intertidal is similar to the work that we have done previously for subtidal reef-associated organisms, and has been done without detectable cumulative impact to date. Our proposed survey of the reproductive status and fertilization success of 'opihi is likewise expected to have no detectable impact, but will provide valuable scientific and management information for the entire Hawaiian Archipelago. This type of research is directly mandated by the Proclamation, and is necessary to both maintain ecosystem integrity and provide for adaptive ecosystem management in the face of natural or anthropogenic disasters and global climate change. As outlined above and below, our activities have no detectable effect to diminish Monument resources, nor have any known indirect, secondary or cumulative effects on the ecosystem or resources therein. Because we are conservation biologists who are concerned about exactly these sort of impacts, we have voluntarily conducted a threat assessment of the activities in the Monument (Selkoe et al. 2008) and compiled a cumulative impact threat map of

the Monument (Selkoe et al. 2009) which has been provided to the co-trustees for use in future management decisions.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.

We expect it is self-evident that there is no practical alternative to sampling within the Monument when the goal of the research is to understand the baseline ecosystem state of the intertidal populations within the Monument. Likewise, surveys of biodiversity within understudied habitats of the Monument which seek to determine the species present, their abundance and distribution are only possible within the bounds of the region of interest. Finally, these studies will be of both direct benefit to the resource management within the Monument itself, and to the remainder of the Hawaiian Archipelago for ecologically, economically and culturally important species such as 'opihi.

The one exception that may not seem so self-evident is the examination of gonad index and fertilization success within the Monument. This work is needed to examine the baseline state of the populations in the absence of human harvest and will provide important information about spawning capacity, timing and reproductive compatibility across the archipelago as well as the cultural information outlined in Ms. Tom's permit application. Finally, 'opihi are a unique system in which to study speciation in the sea and understand how Hawaiian biodiversity has been generated. By studying the cross-species fertilization success of individuals found in areas where all 3 species co-exist (the Main eight) to that in areas where only 1 or 2 of the species are found naturally (the NWHI) we can gain important insights into the processes that have led to the diversification of the endemic 'opihi and may be responsible for generating future biodiversity in Hawai'i and the Pacific

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?

Given that we can detect no adverse effects of any of our previous activities on the resources of the Monument, we believe that the end value of this research clearly outweighs whatever imperceptible impact exists. The proposed research will provide the first quantitative baseline survey of intertidal ecosystems across the Hawaiian Archipelago and address questions of vulnerability to climate change. We have an established track record of communicating our findings to the resource managers and making sure that all research conducted within the Monument meets the bar of direct management relevance. Additionally, the reproductive work proposed herein will benefit both population studies and resource management of 'opihi stocks in Hawai'i, but also contribute to our understanding of how new species can arise in the sea. Finally, the intertidal zone is a greatly understudied ecosystem that is likely to be one of the most directly and immediately impacted by climate change because it experiences the extremes of both terrestrial and marine environments daily. An understanding of the intertidal communities across this region will identify potentially vulnerable locations and species, and (as outlined above) greatly increase the decision-making capacity of the co-trustees in dealing with the reality of future climate change within both the Monument and the Hawaiian Archipelago overall.

e. Explain how the duration of the activity is no longer than necessary to achieve its stated purpose.

The expedition length is determined by limited funding, which makes it shorter than ideal, and is certainly no longer than is necessary to accomplish the research goals outlined in this permit application.

f. Provide information demonstrating that you are qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.

I have a PhD in Population Biology, and our lab has published more than 150 research papers in peer-reviewed journals dealing specifically with the subject of conservation and management of Hawaiian natural resources. Likewise, Chris Bird holds a PhD and is widely acknowledged as the leading scientific authority on ʻopihi biology and ecology globally. Together, we have been studying ʻopihi and Hawaiian intertidal communities since before to the establishment of the Monument. This research has been of considerable interest to both the science and management community of Hawaiʻi and has begun to receive international recognition for the insights we are gaining to understand divergent selection leading to speciation in the sea. This on-going project should be well known to the Monument co-trustees, and our research accomplishments are presented in regular meetings with the management community and semi-annual meetings. Our accomplishments and qualifications to perform this research are further documented in our included CVs. I will be responsible for the conduct of the scientific team and work closely with the cultural practitioner team to ensure a successful mission. If Chris Bird replaces me, he will serve as the field PI on this mission, and will assume this same responsibility.

g. Provide information demonstrating that you have adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.

This mission requires no specific funding beyond the cost of mounting the expedition to complete the primary research goal of ʻopihi monitoring. The proposed field activities are funded in full by NOAA for the Papahānaumokuākea Marine National Monument. The data analysis and storage will be supported by the Monument as necessary and the Hawaii Institute of Marine Biology. The success of the unfunded ʻopihi partnership demonstrates our collective commitment to this effort and our ability to complete this sort of work voluntarily even in the absence of funding. We are able to leverage the existence of samples to obtain federal funding from a variety of sources, and have an established track record of doing exactly that. As outlined in our CVs, we also have a clearly established track record of completing and publishing the research conducted in the Papahānaumokuākea Marine National Monument on a reasonable time frame, and have every intention to continue that tradition. Finally, we provide regular individual research updates to the management community and will also continue that effort in the future.

h. Explain how your methods and procedures are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument cultural, natural and historic resources, qualities, and ecological integrity.

Our choice of sites are guided by personal safety and natural resource concerns within the Monument, but are constrained by the fact that intertidal communities that support 'opihi populations are limited to basaltic emergent islands (Nihoa, Mokumanamana, Mokupapapa & Puhahonu). Minimizing our impact on the natural resources of the Monument is critical to us because they are the focus of the study for purposes of conservation, and we absolutely do not want to detract from that system we are seeking to conserve. The methods and procedures we propose to use are widely accepted and are among the few that directly incorporate Native Hawaiian marine practitioners, resource managers and research scientists in collaborative study that is co-designed and jointly implemented. Our success in obtaining extramural funding, our rate of publication in high quality scientific journals, and the frequency with which those studies are cited all show that the work being performed is accepted, valued and endorsed by the global scientific community. Belt transects do not require any specialized equipment and are simple enough to be employed by community members without scientific training across the inhabited Main eight Hawaiian islands. All our work takes full account the unique value and seeks to minimize any potential for impact to the Monument natural and cultural resources.

i. Has your vessel has been outfitted with a mobile transceiver unit approved by OLE and complies with the requirements of Presidential Proclamation 8031?

We are awaiting a ship be secured for this mission. Whatever vessel is used, the partner NOAA PMNM staff will ensure it meets the VMS type-approval requirement as stated in Monument regulations.

j. Demonstrate that there are no other factors that would make the issuance of a permit for the activity inappropriate.

There are no other factors that would make the issuance of the permit inappropriate. The activity is non-commercial. The end-value of the activity is informational and is intended solely to provide local and governmental managers with information critical to the conservation of natural resources.

8. Procedures/Methods:

The primary objectives of this research expedition are to: (1) collect complementary data on the intertidal ecosystem with a suite of research scientists, cultural practitioners, and resource managers; (2) establish a baseline survey of intertidal ecosystems, specifically focused on 'opihi species associations, relative abundance, and reproductive cycles to better understand the implications and consequences of climate change on these communities; (3) determine the species present using joint morphological and molecular DNA analyses to characterize the biodiversity of the Hawaiian intertidal zone and their connectivity to one another across the archipelago; and (4) begin to explore the mechanisms of speciation in the sea using 'opihi as a model system to elucidate the mechanisms by which divergent selection can lead to adaptive radiation of marine species.

To accomplish this goal, we conduct at least 20 belt transects per island located randomly at sites selected based on access, safety and weather conditions. The transect methodology and data collection sheets come from a series of joint retreats between the resource management agency, NGO, research scientist and cultural practitioner partners to develop a collaborative protocol in which we developed. The data sheet and collaborative protocol, are described in more detail in Ms. Tom's permit application. In brief, we conduct a series of at least 20 belt transects per island, in which teams mark the start of the transect by recording the GPS waypoints. We then lay a transect sash chain perpendicular to the shoreline (mauka to makai), spanning at least the first and last 'opihi on the shore. We use colored cable ties to mark the zone boundaries, and count all 'opihi by size class within each boundary. We count all other visually identifiable intertidal organisms associated with the 'opihi and record the species present and the abundance of each along the transect lines. We then measure the "tight" distance from the start to the end of the transect line before measuring the "rugose" length of the transect laid to contour the exact surface distance. Each data sheet is double-checked and photographed in the field, and matched with a photograph of the entire transect and the conditions are recorded along with anything else noteworthy along the transect line. An additional photograph is taken every 25cm along the transect chain o capture each zone boundary, and a pinch of the different turf algae is taken within each distinct zone along the transect to sort and ID later, because the turf algae are not identifiable to species in the field. This approach covers both objective (1) and (2), and subsequent laboratory examination of the samples will fulfill objective (3). Objective (4) requires cross fertilization experiments and RAD-tag DNA sequencing that will require cryo-freezing of field collected 'opihi from each island location. Tissue biopsy will be performed with scissors or a small knife or scalpel. We usually only require a few tube feet from an echinoderm, a tip of a walking leg from a crab, or a tiny piece of foot or mantle tissue from a mollusc. We have documented our ability to perform non-lethal sampling in the past, and will follow similar protocols for this work to minimize our impact on the sampled populations. Any samples collected will be shared with Ms. Tom for the gonad index studies as outlined in the accompanying permit application.

The target species we have identified are ones which are abundant and common on every island surveyed to date, and for which the estimated population sizes are so large that collection of 50 individuals per island will have no detectable impact. Our cut off is that we will not sample more than 1% of the population at any site, and preliminary abundance surveys from previous years indicate that populations are well in excess of 5000 individuals per island for each of the species that we have included on this permit application. We will examine connectivity of the intertidal species to compare with the subtidal organisms scored to date and determined whether coral reef species are a good predictor of intertidal species connectivity. DNA samples will be analyzed using standard techniques well–established in the field and in use daily in our lab (see attached CV).

Cryo-frozen sperm samples from 'opihi will be kept until the natural spawning season and used in closed laboratory experiments to examine the success of fertilization in between species in areas of overlap (MHI) and non-overlap (NWHI) to determine the mechanisms and strength of reproductive isolation in these animals. This information will shed important insights into the

mechanisms of speciation in the sea and may help to answer the long-standing question of exactly how endemic Hawaiian species are formed. Fertilization experiments will be scored as outlined in Corpuz (1983) and Bird (2006).

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding, as a customized application will be needed. For more information, contact the Monument office on the first page of this application.

9a. Collection of specimens - collecting activities (would apply to any activity): organisms or objects (List of species, if applicable, attach additional sheets if necessary):

Common name:

Yellowfoot opihi ('opihi 'ālinalina)
Blackfoot opihi ('opihi makaiaūli)
Shingle urchin (hā'uke'uke kaupali)
Black nerite (pipipi)
Spotted periwinkle (pipipi kōlea)
Spotted drupe (makaloa)
Black purse shell (nahawele)
Thin shell rock crab ('a'ama)
Rock-boring urchin ('ina kea)
Oblong urchin ('ina)
Turf algae (limu)
see Appendix 1 for detailed list of samples.

Scientific name:

Cellana exarata
Cellana sandwicensis
Nesochthamalus intertextus
Isognomon californicum
Smaragdinella calyculata
Grapsus tenuicrustatus
Entomacrodus marmoratus
Istiblennius zebra
Drupa ricina
Echinolittorina hawaiiensis
Littoraria pintado
Nerita picea
Siphonaria normalis
Colobocentrotus atratus
Echinometra oblonga

Echinometra mathaei
see Appendix 1 for detailed list of samples

& size of specimens:

Up to 50 individuals per species per island of these common intertidal species as outlined in Appendix 1. We request up to 100 individuals of *Siphonaria normalis* (false 'opihi) per location because we have reason to believe that this may include an unknown cryptic species that requires further study to tease apart taxonomically.

Collection location:

Intertidal zones around basaltic emergent islands at Nihoa, Mokumanamana, Mokupapapa & Puhahonu.

☒ Whole Organism ☒ Partial Organism

9b. What will be done with the specimens after the project has ended?

Preserved samples remain the property of the Monument, and will maintained with population preserved connectivity biopsy tissue samples collected to date at HIMB until they are used up by the study or such time as the Monument co-trustees request that they be returned to them. Taxonomic voucher specimens will be submitted for permanent inclusion in museum collections as per the voucher specimen guidelines. Cryo-frozen gonad samples will be exhausted in study and will have no remains after the experiment is complete. Shared samples will be subsampled for DNA analyses before being turned over to cultural practitioners for detailed examination as outlined in the accompanying permit application by Ms. Tom.

9c. Will the organisms be kept alive after collection? ☐ Yes ☒ No

• General site/location for collections:

• Is it an open or closed system? ☐ Open ☐ Closed
Closed aquarium systems with water changes done by hand.

• Is there an outfall? ☐ Yes ☐ No

• Will these organisms be housed with other organisms? If so, what are the other organisms?

• Will organisms be released?

10. If applicable, how will the collected samples or specimens be transported out of the Monument?

Preserved samples (in ethanol or saturated salt buffer) will be transported back to HIMB aboard the vessel. Voucher specimens will be subsampled for genetic analysis and stored frozen or in preservative prior to study. All samples to be transported will be packed and transported in accordance with the Monument's specimen transport policies.

11. Describe collaborative activities to share samples, reduce duplicative sampling, or duplicative research:

All researchers working on this project have coordinated to share samples and avoid duplicate sampling. Specifically, the samples listed here and those in the accompanying permit application by Ms. Tom are explicitly the same samples and not duplicative or in addition to one another.

12a. List all specialized gear and materials to be used in this activity:

We will collect samples by hand using no specialized gear or materials beyond snorkeling gear, transect lines and data sheets.

12b. List all Hazardous Materials you propose to take to and use within the Monument:

Tissue preservative solutions for DNA analyses include: 95% ethanol (EtOH), MSDS attached, and saturated salt buffer with dimethyl sulfoxide (DMSO), MSDS attached. Both EtOH and DMSO are commonly sold for human consumption, and should not pose any significant health or environmental risk.

13. Describe any fixed installations and instrumentation proposed to be set in the Monument:

None

14. Provide a time line for sample analysis, data analysis, write-up and publication of information:

Surveys will be completed in the field during the expedition. Data analysis and write-up will depends on the availability of specific support for researchers post-cruise. With current levels of partial support and volunteer activities, we expect it will take roughly an additional year to complete the post-cruise analysis of survey data. Time to publication can be considerably longer since the turn-around time for some journals now exceeds 800 days, but results will be reported as soon as possible among the partners and to the resource management community.

Regardless of the time to publication, the results from these studies are made available to Monument managers as quickly as possible through the brown-bag luncheons, semi-annual reports, and semi-annual mini symposium during which all researchers involved in this project present the most current findings from their ongoing research to the broader management community. Findings are always provided to the Monument co-trustees almost as quickly as

they become available, and made available to the greater management community within no more than 6 months of the data being collected. Finally, given the specific partnership of Hawaiian cultural practitioners, NGO community, State and Federal resource managers, and research scientists, we are confident that research results will be communicated widely.

Additionally this permit application is a partner to the Native Hawaiian Practices permit application of Ms. Kehau Tom. All samples and methodologies discussed in this permit application are directly related to both permit applications and are the same samples, not in addition to one another. This project and its group of dedicated participants will continue to bridge the gap between cultural and western research in Papahānaumokuākea Marine National Monument, and community participants will communicate our collective findings to their respective communities (Hana, Kalapana, etc.) as outlined in Ms. Tom's permit application.

15. List all Applicants' publications directly related to the proposed project:

Bird, C.E., B. Holland, B.W. Bowen & R.J. Toonen. Diversification of sympatric broadcast-spawning limpets (Cellana spp.) within the Hawaiian archipelago. Molecular Ecology. In press
Puritz, J.B & R.J. Toonen. Coastal pollution limits pelagic larval dispersal. Nature Communications. In press.
Stat, M., C.E. Bird, X. Pochon, L. Chasqui, L.J. Chauka, G.T. Concepcion, D. Logan, M. Takabayashi, R.J. Toonen & R.D. Gates. Spatial distribution of Symbiodinium ITS2 in corals: interpretations associated with a multi-copy intra-genomically variable marker. PLoS ONE In press.
Eble, J.A., R.J. Toonen, L. Sorenson, L.V. Basch, Y.P. Papastamatiou & B.W. Bowen. Escaping paradise: larval export from Hawaii in an Indo-Pacific reef fish, the Yellow Tang (Zebrasoma flavescens). Marine Ecology Progress Series. In press.
Toonen, R.J., K.R. Andrews, I.B. Baums, C.E. Bird, G.T. Concepcion, T.S. Daly-Engel, J.A. Eble, A. Faucci, M.R. Gaither, M. Iacchei, J.B. Puritz, J.K. Schultz, D.J. Skillings, M. Timmers & B.W. Bowen. Defining boundaries for ecosystem-based management: A multispecies case study of marine connectivity across the Hawaiian Archipelago. Journal of Marine Biology. Volume 2011, Article ID 460173, 13 pages.
Szabo, Z., B.K. Kimokeo, R.J. Toonen & J.E. Randall. On the status of the Hawaiian seahorses Hippocampus hilonis, H. histrix, and H. fisheri. Marine Biological Research. In press.
Skillings, D., C.E. Bird & R.J. Toonen. Gateways to Hawai'i – genetic population structure of the tropical sea cucumber Holothuria atra. Journal of Marine Biology. In press
Wiener, C.S., M. Rivera, R.J. Toonen, J. Leong, R.K. Kosaki, S.A. Karl, K. Keller & H. Johnson.
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Timmers, M.A., K. Andrews, C.E. Bird, M.J. deMaintenon, R.E. Brainard & R.J. Toonen,. Widespread dispersal of the crown-of-thorns sea star, Acanthaster planci, across the Hawaiian Archipelago and Johnston Atoll. Journal of Marine Biology. In press
Rivera, M., K. Andrews, D. Kobayashi, J. Wren, C. Kelley, G. Roderick & R.J. Toonen. Genetic analyses and simulations of larval dispersal reveal distinct populations and directional

connectivity across the range of the Hawaiian Grouper (Epinephelus quernus). Journal of Marine Biology. In press
DiBattista, J., C. Wilcox, M. Craig, L.A. Rocha & B.W. Bowen. Phylogeography of the Bluelined Surgeonfish, Acanthurus nigroris, reveals high connectivity and a cryptic endemic species in the Hawaiian Archipelago. Journal of Marine Biology Accepted
Wagner, D., X. Pochon, L. Irwin, R.J. Toonen & R.D. Gates (2011). Azooxanthellate? Most Hawaiian black corals contain Symbiodinium. Proceedings of the Royal Society B: Biological Sciences. 278(1710):1323-1328.
Gaither, M.R., Z. Szabó, M. Crepeau, C.E. Bird & R. Toonen (2010). Preservation of corals in salt-saturated DMSO buffer is superior to ethanol for PCR experiments. Coral Reefs. Accepted.
Feldheim, K.A., J.D. DiBattista, B.W. Bowen. Microsatellite DNA markers for population genetic and hybridization analysis of two closely related surgeonfish species, Acanthurus nigricans and Acanthurus leucosternon. Conservation Genetic Resources In press
DiBattista, J.D., K.A. Feldheim. Isolation and characterization of eight microsatellite loci in Chaetodon ornatissimus and cross-amplification in its sympatric sister species, Chaetodon meyeri. Conservation Genetic Resources In press
Eble, J.A., L.A. Rocha, M.T. Craig, B.W. Bowen. (2011) Not all larvae stay close to home: Insights into marine population connectivity with a focus on the Brown Surgeonfish. Journal of Marine Biology. Volume 2011, Article ID 518516, 12 pp.
Forsman, Z.H., G.T.Concepcion, R.D.Haverkort, R.W.Shaw, J.E.Maragos & R.J.Toonen Ecomorph or Endangered Coral? DNA and Microstructure Reveal Hawaiian Species Complexes: Montipora dilatata/flabellata/turgescens & M. patula/verrilli. PLoS ONE In press
Polato, N.R., G.T. Concepcion, R.J. Toonen & I.B. Baums. Isolation by distance across the Hawaiian Archipelago in the reef-building coral Porites lobata. Molecular Ecology In press
Schultz, J.K., J.D. Baker, R.J. Toonen, A.L. Harting, B.W. Bowen. Seals and alleles on the move: genetic structure of the Hawaiian monk seal (Monachus schauinslandi) and implications for management. Conservation Biology In press
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Concepcion, G.T., N.R Polato, I.B. Baums & R.J. Toonen. 2010. Development of microsatellite markers from four Hawaiian corals: Acropora cytherea, Fungia scutaria, Montipora capitata and Porites lobata. Conservation Genetics Resources Online Early (doi: 10.1007/s12686-009-9118-4)
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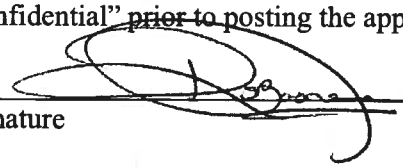
With knowledge of the penalties for false or incomplete statements, as provided by 18 U.S.C. 1001, and for perjury, as provided by 18 U.S.C. 1621, I hereby certify to the best of my abilities under penalty of perjury of that the information I have provided on this application form is true and correct. I agree that the Co-Trustees may post this application in its entirety on the Internet. I understand that the Co-Trustees will consider deleting all information that I have identified as "confidential" ~~prior to~~ posting the application.



Signature _____ Date 4/28/2011

SEND ONE SIGNED APPLICATION VIA MAIL TO THE MONUMENT OFFICE BELOW:

Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
FAX: (808) 397-2662

DID YOU INCLUDE THESE?

☒ Applicant CV/Resume/Biography
☒ Intended field Principal Investigator CV/Resume/Biography
☒ Electronic and Hard Copy of Application with Signature
☒ Statement of information you wish to be kept confidential
☒ Material Safety Data Sheets for Hazardous Materials

Appendix 1: Species number and sample size

Species	Type	Distribution	Sampling	Nihoa	Mokumanamana	Mokupapapa	Puhahonu	Gonads
Cellana exarata	snail	Hawaii	Lethal	50	50	50	50	Y*
Cellana sandwicensis	snail	Hawaii	Lethal	50	50	50	50	Y*
Nesochthamalus intertextus	Barnacle	Hawaii	Lethal	50	50	50	50	
Isognomon californicum	Bivalve	Hawaii	Lethal	50	50	50	50	
Smaragdinella calyculata	Bubble Shell	Indo-Pac	Lethal	50	50	50	50	
Grapsus tenuicrustatus	Crab	Indo-Pac	Non-lethal	50	50	50	50	
Entomacrodus marmoratus	Fish	Hawaii	Non-lethal	50	50	50	50	
Istiblennius zebra	Fish	Hawaii	Non-lethal	50	50	50	50	
Drupa ricina	Snail	Indo-Pac	Non-lethal	50	50	50	50	
Echinolittorina hawaiiensis	Snail	Hawaii	Lethal	50	50	50	50	
Littoraria pintado	Snail	Indo-Pac	Lethal	50	50	50	50	
Nerita picea	Snail	Hawaii	Lethal	50	50	50	50	
Siphonaria normalis	Snail	Indo-Pac	Lethal	100	100	100	100	
Colobocentrotus atratus	Urchin	Indo-Pac	Lethal	50	50	50	50	Y
Echinometra oblonga	Urchin	Indo-Pac	Non-lethal	50	50	50	50	
Echinometra mathaei	Urchin	Indo-Pac	Non-lethal	50	50	50	50	
pinch of turf algae	limu		Non-lethal	up to 20 pinches / transect for biodiversity surveys				

Lethal sampling denotes that the whole animal will be taken for either scientific or cultural research. Gonads (Y) denotes inclusion in the gonad index cultural survey. Gonad (Y*) indicates that isolated sperm from the gonads will also be cryo-frozen to determine if it can successfully fertilize ripe eggs in the laboratory.

Papahānaumokuākea Marine National Monument
Compliance Information Sheet

1. Updated list of personnel to be covered by permit. List all personnel names and their roles here (e.g. John Doe, Diver; Jane Doe, Field Technician, Jerry Doe, Medical Assistant):
Hoku Johnson (Coordinator), Chris Bird (Researcher), Kehau Tom (Researcher), Patrick Springer (Medical Assistant), Emily Fielding (Researcher), Illy Igleasias (Researcher), Jennifer Smith (Researcher), TBA Phycologist, TBA Hana, TBA Kalapana, Pelika Bertlemann (Researcher – alternate)

2. Specific Site Location(s): (Attach copies of specific collection locations):
Nihoa Island, Necker Island (Mokumanamana), French Frigate Shoals, Gardner Pinnacles

3. Other permits (list and attach documentation of all other related Federal or State permits):
This project will be conducted alongside Native Hawaiian Cultural Practices Permit Number PMNM-2011-0xx (submitted by Kehau Tom)

3a. For each of the permits listed, identify any permit violations or any permit that was suspended, amended, modified or revoked for cause. Explain the circumstances surrounding the violation or permit suspension, amendment, modification or revocation.
None

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information):
As outlined in the permit application this trip is fully supported by NOAA / NOS / Office of National Marine Sanctuaries, Papahānaumokuākea Marine National Monument and the Hawaii Institute of Marine Biology.

5. Time frame:
Activity start: 25 September 2011
Activity completion: Ongoing

Dates actively inside the Monument:
From: 25 September 2011

To: 25 October 2011

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application:

Personnel schedule in the Monument:
TBD. A complete itinerary is forthcoming. The project is aiming to spend 1-3 days at each of the aforementioned sites (Nihoa, Mokumanamana, French Frigate Shoals and Gardner Pinnacles) depending on weather conditions.

6. Indicate (with attached documentation) what insurance policies, bonding coverage, and/or financial resources are in place to pay for or reimburse the Monument trustees for the necessary search and rescue, evacuation, and/or removal of any or all persons covered by the permit from the Monument:

This project is fully supported by PMNM-HIMB research partnership. The University of Hawai'i, Hawai'i Institute of Marine Biology is self-insured. In addition the cruise participants will carry emergency evacuation insurance (e.g. DAN insurance or something comparable).

7. Check the appropriate box to indicate how personnel will enter the Monument:

☒ Vessel
☐ Aircraft

Provide Vessel and Aircraft information:
Searcher

8. The certifications/inspections (below) must be completed prior to departure for vessels (and associated tenders) entering the Monument. Fill in scheduled date (attach documentation):
All certifications will be completed prior to entry. A hull, tender, ballast water and gear inspection will be completed two weeks prior to sailing.
☐ Rodent free, Date:
☐ Tender vessel, Date:
☐ Ballast water, Date:
☐ Gear/equipment, Date:
☐ Hull inspection, Date:

9. Vessel information (NOTE: if you are traveling aboard a National Oceanic and Atmospheric Administration vessel, skip this question):
Vessel name: SEARCHER
Vessel owner: The Medical Foundation for the Study of the Environment
Captain's name: Jonathan Littenberg
IMO#:192
Vessel ID#: U.S. Coast Guard 1103056
Flag: U.S.
Vessel type: Steel Hull
Call sign: WDA 6100
Embarkation port: Honolulu
Last port vessel will have been at prior to this embarkation: Honolulu
Length: LOA 96 FT / Registered 78.1 FT
Gross tonnage: 197
Total ballast water capacity volume (m3): N/A
Total number of ballast water tanks on ship: N/A
Total fuel capacity: 9,600 Gallons
Total number of fuel tanks on ship: 6
Marine Sanitation Device: Yes
Type: II

Explain in detail how you will comply with the regulations regarding discharge in the Monument. Describe in detail. If applicable, attach schematics of the vessel's discharge and treatment systems:

All materials and fluids shall be properly stored in holding tanks while the vessel is in Monument waters and will be properly disposed of upon our exit from the Monument.

Other fuel/hazardous materials to be carried on board and amounts:

Approximately 30 gallons of unleaded fuel in jerry cans for use in the skiffs.

Provide proof of a National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement-approved Vessel Monitoring System (VMS). Provide the name and contact information of the contractor responsible for installing the VMS system. Also describe VMS unit name and type:
Vessel Monitoring System – Thrane & Thrane Sailor TT-3606XP

VMS Email: 436998398@c12.stratoemobile.net
Inmarsat ID#: 4TT072E62B15
Contact: Jonathan Littenberg (808.225.8982) or Barbara Littenberg (808.221.6156)

10. Tender information:

On what workboats (tenders) will personnel, gear and materials be transported within the Monument? List the number of tenders/skiffs aboard and specific types of motors:

One 16-foot RHIB Zodiac with Yamaha 4 stroke engine or one new 16 foot inflatable Avon with Yamaha 4-stroke tiller engine.

Additional Information for Land Based Operations

11. Proposed movement of personnel, gear, materials, and, if applicable, samples:
none

12. Room and board requirements on island:
none

13. Work space needs:
none

DID YOU INCLUDE THESE?
☐ Map(s) or GPS point(s) of Project Location(s), if applicable
☐ Funding Proposal(s)
☐ Funding and Award Documentation, if already received
☐ Documentation of Insurance, if already received
☐ Documentation of Inspections
☐ Documentation of all required Federal and State Permits or applications for permits

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

GUY KAULUKUKUI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813

August 12, 2011

TO: Division of Aquatic Resources File

THROUGH: William J. Aila, Jr., Chairperson

FROM: Francis Oishi
Division of Aquatic Resources

SUBJECT:

DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. ROBERT TOONEN, UNIVERSITY OF HAWAII, HAWAII INSTITUTE OF MARINE BIOLOGY, FOR ACCESS TO STATE WATERS TO CONDUCT INTERTIDAL BIODIVERSITY SURVEY ACTIVITIES UNDER PERMIT PMNM-2011-041.

The following permitted activities are found to be exempted from preparation of an environmental assessment under the authority of Chapter 343, HRS and Chapter 11-200, HAR:

Project Title:
Papahānaumokuākea Marine National Monument Research Permit to Dr. Robert Toonen, University of Hawaii, Hawaii Institute of Marine Biology, for Access to State Waters to Conduct Intertidal Biodiversity Survey Activities

Permit Number: PMNM-2011-041

Project Description:
The research permit application, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument (Monument), including the NWHI State waters from September 1, 2011 through November 30, 2011.

The Applicant proposes to collect samples of common intertidal invertebrates, fish, and algae by hand in order to establish an intertidal baseline survey of the NWHI, to characterize the biodiversity, and explore the mechanisms of genetic speciation in the sea.

The proposed activities are in direct support of the Monument Management Plan's priority management need 3.1 – Understanding and Interpreting the NWHI (through action plan 3.1.1 –

Marine Conservation Science). This action plan specifies to "measure connectivity and genetic diversity of key species to enhance management decisions." Activities to support marine conservation science, including biodiversity and genetic diversity surveys such as those to be carried out by the permittee, are also addressed in the Monument Management Plan Environmental Assessment. This EA summarizes that understanding the genetic diversity of species groups and how these populations change could be helpful to forecast, prepare for and mediate potential threats to populations within the Monument (PMNM MMP Vol. 2, p.171). Identification of biodiversity and genetic diversity of invertebrates in the NWHI, such as those proposed, would enhance this understanding.

Consulted Parties:
The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since June 10th, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Exemption Determination:
After reviewing HAR § 11-200-(8), including the criteria used to determine significance under HAR § 11-200-12, DLNR has concluded that the activities under this permit would have minimal or no significant effect on the environment and that issuance of the permit is categorically exempt from the requirement to prepare an environmental assessment based on the following analysis:

1. All activities associated with this permit, including transect monitoring and tissue biopsy sampling and subsequent genetic and taxonomic study of reef fish, algae, and invertebrates, have been evaluated as a single action. As a preliminary matter, multiple or phased actions, such as when a group of actions are part of a larger undertaking, or when an individual project is precedent to or represents a commitment to a larger project, must be grouped together and evaluated as a single action. HAR § 11-200-7. Since this permit involves an activity that is precedent to a later planned activity, i.e. the continuation of nearshore biodiversity monitoring and sampling and associated genetic studies, the categorical exemption determination here will treat all planned activities as a single action.

2. The Exemption Class for Scientific Research with no Serious or Major Environmental Disturbance Appears to Apply. Chapter 343, HRS, and section 11-200-8, HAR, provide for a list of classes of actions exempt from environmental assessment requirements. HAR §11-200-8(A)(5) specifically exempts the class of actions which involve "basic data collection, research, experimental management, and resource evaluation activities, which do not result in a serious or major disturbance to an environmental resource." This exemption class has been interpreted to include fisheries research related to the development and management of various aquatic organisms, including life history, migration, and growth studies, such as those being proposed.

Accordingly, the former Division of Fish and Game established its own published list of exempted activities types under this exemption class, including "surveys, censuses, inventories,

studies, photographing, recording, sampling, collection, culture and captive propagation of aquatic biota" DEPARTMENT OF LAND & NATURAL RESOURCES, EXEMPTION LIST FOR THE DIVISION OF FISH AND GAME 3-4 (January 19, 1976).

The proposed sampling for genetic and biodiversity study activities here appear to fall squarely under the exemption class identified under HAR § 11-200-8(a)(5), and are succinctly described under the former Fish and Game Division exemption list published in 1976, as involving the collection and non-lethal sampling of aquatic animals to study migration patterns and life cycles. As discussed below, no significant disturbance to any environmental resource is anticipated in either the proposed lethal specimen collection, non lethal tissue biopsy sampling, or voucher specimen collections proposed by this Applicant. Thus, so as long as the below considerations are met, an exemption class should include the action now contemplated.

3. Cumulative Impacts of Actions in the Same Place and Impacts with Respect to the Potentially Particularly Sensitive Environment Will Not be Significant. Even where a categorical exemption appears to include a proposed action, the action cannot be declared exempt if "the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment." HAR § 11-200-8(B). To gauge whether a significant impact or effect is probable, an exempting agency must consider every phase of a proposed action, any expected primary and secondary consequences, the long-term and short-term effects of the action, the overall and cumulative effect of the action, and the sum effects of an action on the quality of the environment. HAR § 11-200-12. Examples of actions which commonly have a significant effect on the environment are listed under HAR § 11-200-12.

While the specific intent and goals of this project are unique, past projects have included similar collections and techniques with no adverse impact. Similar nearshore biodiversity monitoring activities have been permitted and performed within the NWHI. In addition, lethal and non lethal genetic tissue sampling has also been undertaken in the marine environment within PMNM. The species targeted for collection in this project are ones identified as being abundant and common on every island surveyed to date, for which the estimated population sizes are so large that collection of 50 individuals per island would have no detectable impact. The Applicant notes that no more than 1% of the population at any site would be sampled. With this in mind, significant cumulative impacts are not anticipated as a result of this activity, and numerous safeguards further ensure that the potentially sensitive environment of the project area will not be significantly affected. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts, nor did it raise any cultural concerns, that would occur as a result of these activities.

Since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

The activities would be conducted from the NOAA contracted vessel, R/V Searcher (PMNM-2011-001), during late September and October 2011. There is one other proposed activity that is anticipated to take place on this vessel pending approval of the permit application.

The other proposed activity, Tom (PMNM-2011-040) would also take place in the intertidal area of these islands at the same time. Tom proposes a Native Hawaiian Practices observational approach to studying this habitat and its associated organisms. The two proposed activities while differing in their approach to understanding this habitat were co-designed with the same goal of adding a greater total knowledge base for this region. As such, there would be no duplicate sampling of the resources nor organisms since the proposals were cohesively designed together.

The culmination of these permits, occurring in the southern half of the Monument over a 2-week period, is not anticipated to have significant cumulative impacts. The NOAA Ship OSCAR ELTON SETTE (PMNM-2011-008) may also be in the Monument during this time frame facilitating needs of the monk seal camps under the management permit (PMNM-2011-001).

Since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

4. Overall Impacts will Probably be Minimal and Insignificant. Again, any foreseeable impacts from the proposed activity will probably be minimal, and further mitigated by general and specific conditions attached to the permit. Specifically, all research activities covered by this permit will be carried out with strict safeguards for the natural, historic, and cultural resources of the Monument as required by Presidential Proclamation 8031, other applicable law and agency policies and standard operating procedures.

Conclusion. Upon consideration of the permit to be approved by the Board of Land and Natural Resources, the potential effects of the above listed project as provided by Chapter 343, HRS and Chapter 11-200 HAR, have been determined to be of probable minimal or no significant effect on the environment and exempt from the preparation of an environmental assessment.

_____ _____

William J. Aila, Jr. Date
Chairperson, Board of Land and Natural Resources